



Model Predictive Control for an Industrial SAG Mill

Ohan, Valeriu; Steinke, Florian; Metzger, Michael; Runkler, Thomas; Jørgensen, John Bagterp

Published in:
Proceedings of the 17th Nordic Process Control Workshop

Publication date:
2012

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Ohan, V., Steinke, F., Metzger, M., Runkler, T., & Jørgensen, J. B. (2012). Model Predictive Control for an Industrial SAG Mill. In J. B. Jørgensen, J. K. Huusom, & G. Sin (Eds.), *Proceedings of the 17th Nordic Process Control Workshop* (pp. 208). Technical University of Denmark. <http://npcw17.imm.dtu.dk/>

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Model Predictive Control for an Industrial SAG Mill

Valeriu Ohan^{*,**} Florian Steinke^{**} Michael Metzger^{**}
Thomas Runkler^{**} John Bagterp Jørgensen^{*}

^{*} DTU Informatics

Technical University of Denmark, 2800 Kgs Lyngby, Denmark
(e-mail: jbj@imm.dtu.dk).

^{**} Siemens AG, Corporate Technology, Intelligent Systems & Control,
80200 Munich, Germany

(e-mail:

{Florian.Steinke,Michael.Metzger,Thomas.Runkler}@siemens.com})

Abstract: We discuss Model Predictive Control (MPC) based on ARX models and a simple lower order disturbance model. The advantage of this MPC formulation is that it has few tuning parameters and is based on an ARX prediction model that can readily be identified using standard technologies from system identification. When applied to MIMO systems we call this controller a MIMO-ARX based MPC.

We use an industrial Semi-Autogenous Grinding (SAG) mill to illustrate the performance of this controller. SAG mills are the primary units in a grinding chain and also the most power consuming units. Therefore, improved control of SAG mills has the potential to significantly improve efficiency and reduce the specific energy consumption for mineral processes. Grinding circuits involving SAG mills are multivariate processes. Commissioning of a control system based on a classical single-loop controllers with logic is time consuming, while MPC has the potential to both improve the control performance and the commissioning time and expertise required. The simulation results demonstrate that the MPC based on a MIMO-ARX model is able to provide nice control performance measured by its ability to track an output reference and reject unknown disturbances. Furthermore, the method used to design the controller represents a systematic method that can be automatized for wide-spread deployment in industrial environments.

Keywords: Model Predictive Control, ARX Model, SAG Mill, Mineral Processes, Industrial Process Control
